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International application number: PCT/US2005/036647

International filing date: 06 October 2005 (06.10.2005)

Document type: Certified copy of priority document

Document details: Country/Office: US
Number: 60/617,289
Filing date: 08 October 2004 (08.10.2004)

Date of receipt at the International Bureau: 19 December 2005 (19.12.2005)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)

World Intellectual Property Organization (WIPO) - Geneva, Switzerland
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APPLICATION NUMBER: *60/617,289*
FILING DATE: *October 08, 2004*
RELATED PCT APPLICATION NUMBER: *PCT/US05/36647*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS *US60/617,289*

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Express Mail Label No. EV387235291US

17231 U.S.PTO 100804

2154 U.S.PTO 60/617289 100804

INVENTOR(S)

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Additional inventors are being named on the 1 *separately numbered sheets attached hereto*

TITLE OF THE INVENTION (500 characters max)

RADIANCE LIGHTING SYSTEM AND METHOD

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

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ENCLOSED APPLICATION PARTS *(check all that apply)*

☑ Specification *Number of Pages* 12

☑ Drawing(s) *Number of Sheets* 8

☐ Application Data Sheet. See 37 CFR 1.76

☐ CD(s), Number

☑ Other (specify) 20 pages total which includes specification and drawings.

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☑ Applicant claims small entity status. See 37 CFR 1.27.

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FILING FEE Amount ($): $80.00

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Respectfully submitted,

SIGNATURE Frederic M. Douglas

Date Oct 8, 2004

TYPED or PRINTED NAME Frederic M. Douglas

REGISTRATION NO. 48,813 *(if appropriate)*

Docket Number: 108-0103

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Docket Number 108-0103

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Dennis	Pearson	Irvine, California

Number 1 of 1

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Docket No.: 108-0103

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Terry Horowitz et al.

For: RADIANCE LIGHTING SYSTEM AND METHOD

CERTIFICATE OF EXPRESS MAILING

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Provisional Application For Patent Cover Sheet which includes 12 pages of Specification, 8 Sheet(s) of Drawings (20 pages total); a check in the amount of $80.00; and Return Postcard are being deposited with the U.S. Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. § 1.10 on the date indicated above and is addressed to: MAIL STOP PROVISIONAL APPLICATION, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Frederic M. Douglas, Reg. No. 48,813
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RADIANCE LIGHTING SYSTEM AND METHOD

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram schematically representing a lighting system, according to one embodiment of the invention;

Figure 2 is a block diagram schematically representing a light source module, according to another embodiment of the invention;

Figure 3A is a plan view of a portion of a wiring assembly for a lighting system, according to another embodiment of the invention;

Figure 3B is a plan view of a portion of a lighting system, according to another embodiment of the invention;

Figure 3C is a plan view of a light source module, according to another embodiment of the invention;

Figure 4A is an isometric view of a wiring assembly for a lighting system, according to another embodiment of the invention;

Figure 4B is an exploded isometric view of the wiring assembly of Figure 4B;

Figure 5 is an exploded isometric view of a light source module for a lighting system, according to another embodiment of the invention;

Figure 6A is an isometric view of a lighting system showing a partially assembled mounting assembly in relation to a wiring harness and a light source module, according to another embodiment of the invention;

Figure 6B is an exploded isometric view of the lighting system of Figure 6A;

Figure 7 schematically represents a lighting system mounted to a separate structure, according to another embodiment of the invention; and

Figure 8 schematically represents a series of steps involved in a method for lighting a space with a lighting system, according to another embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

The following detailed description is of the best currently contemplated modes of carrying out the invention. The description is not to be taken in a limiting sense, but is made merely for the purpose of illustrating the general principles of the invention, since the scope of the invention is best defined by the appended claims.

Broadly, the present invention provides a lighting system and methods for providing illumination. The present invention may be used to shed visible light to a space or spatial area, such as an interior space, e.g., within a building, or the like. The lighting system of the invention may be modular, allowing use of a suitable number and arrangement of light source modules for illuminating a given space. The light source modules may be readily attached to, or detached from, an electrical wiring assembly. The lighting system of the invention may be adapted for being mounted, e.g., to structures such as walls, ceilings, and the like, via a mounting assembly. The present invention may be used to provide light of different colors by varying the intensities of red, green, and blue light emitted simultaneously from one or more light source modules of the lighting system.

In contrast to conventional lighting systems of the prior art, a lighting system for lighting or illuminating a space or spatial area according to the present invention may comprise a plurality of light source modules, wherein each light source module may comprise at least one circuit board, and at least one light source unit mounted in the circuit board. In further contrast to the prior art, a plurality of circuit board-mounted light sources may be adapted for facile connection to, and disconnection from, an electrical wiring harness. In further contrast to the prior art, the present invention provides a lighting system adapted for providing light of different colors from one or more light source modules, wherein the light source modules can be added or removed as

desired, or may be replaced as required.

Figure 1 is a block diagram schematically representing a lighting system 10, according to one embodiment of the invention. Lighting system 10 may comprise a wiring assembly 20 including a wiring harness 30 electrically coupled to one or more connector units 40. Lighting system 10 may further comprise one or more light source modules 60 coupled to one or more connector units 40, whereby each light source module 60 may be electrically coupled to wiring harness 30.

Lighting system 10 may still further comprise a mounting assembly 50 adapted for at least partially enclosing or containing wiring assembly 20. In some embodiments, mounting assembly 50 may be further adapted for mounting wiring assembly 20 and light source modules 60 to a separate structure, e.g., a wall (see, for example, Figures 6A-B, 7).

Again with reference to Figure 1, lighting system 10 may be coupled to a power supply 12 for providing electrical power to lighting system 10. Power supply 12 may be adapted to provide a voltage, for example, about 12 volts or 24 volts, to lighting system 10. Power supply 12 may comprise, for example, a transformer. Current provided from power supply 12 may be AC or DC. Lighting system 10 may comprise a Class II or Class III appliance.

Figure 2 is a block diagram schematically representing a light source module 60, which may be used as a component of lighting system 10, according to another embodiment of the invention. Light source module 60 may comprise a light source housing 70 and at least one circuit board 80 disposed within housing 70. Circuit board 80 may include at least a first light source unit 90a and a second light source unit 90b. First and second light source units 90a, 90b may be disposed at opposing ends of circuit board 80. Each of first and second light source units 90a, 90b may comprise a plurality of light emitting diodes (LEDs) (see, for example, Figure 5). Various LEDs which emit light of various wavelengths within the visible region of the electromagnetic spectrum,

which may correspond to various colors (e.g., red, green, blue), are well known in the art.

Figure 3A is a plan view of a portion of a wiring assembly 20 for a lighting system 10, according to another embodiment of the invention. Wiring assembly 20 may comprise a wiring harness 30, which may comprise a plurality of wires. As shown, wiring harness 30 may comprise first, second, and third wires 32a, 32b, 32c, respectively. Wiring harness 30 may further comprise a fourth wire 32d. Fourth wire 32d may be a common wire, and fourth wire 32d may be colored white. First, second, and third wires 32a-c, may be colored blue, green, and red, respectively. First, second, and third wires 32a-c, may, in combination with fourth wire 32d, provide three separate circuits within lighting system 10. First, second, and third wires 32a-c, may respectively provide power to a plurality of blue LEDs, a plurality of green LEDs, and plurality of red LEDs, (see, for example, Figure 5).

Again with reference to Figure 3A, wiring assembly 20 may further comprise a plurality of connector units 40. Each of first, second, third, and fourth wires 32a-d may be electrically coupled to each connector unit 40. Connector units 40 may be spaced apart from each other on wiring harness 30, e.g., in the form of a linear array. In some embodiments, connector units 40 may be spaced equidistant from each other by a distance, L_m typically in the range of from about 5 to 7 inches, and usually with a spacing of about 6 inches.

Figure 3B is a plan view of a portion of a lighting system 10, according to another embodiment of the invention. Lighting system 10 may comprise a plurality of light source modules 60, wherein each light source module 60 may be electrically coupled to one of a corresponding plurality of connector units 40. Accordingly, each light source module 60 may be electrically coupled to first, second, third, and fourth wires 32a-d. Light source module 60 may also be mechanically coupled to connector unit 40, e.g., via first, second, third, and fourth connection posts 28a-d (see, for example, Figure 4B). First, second, third, and fourth connection posts 28a-d may also

mechanically couple connector unit 40 to first, second, third, and fourth wires 32a-d.

Light source modules 60 and connector units 40 may each be adapted for the facile connection of light source modules 60 to connector units 40. Light source modules 60 and connector units 40 may also be adapted for the facile disconnection of light source modules 60 from connector units 40, and accordingly, for the facile replacement of any one or more of light source modules 60.

Again with reference to Figure 3B, lighting system 10 may further comprise a mounting assembly 50. Mounting assembly 50 may be adapted for mounting lighting system 10 to a structure, for example, a wall, floor, or ceiling of a building or other space to be illuminated (see, for example, Figures 6A-B, 7). Mounting assembly 50 may be adapted for enclosing or containing wiring harness 30.

Figure 3C is a plan view of a light source module 60, according to one aspect of the present invention. Light source module 60 may include a pair of light source units, namely first light source unit 90a and second light source unit 90b disposed at a first end 60a and a second end 60b, respectively, of light source module 60. First and second light source units 90a, 90b may be spaced apart by a distance L_ℓ, wherein L_ℓ may typically be in the range of from about 2.5 to 3.5 inches, and usually about 3 inches. In some embodiments, where distance L_m is about 6 inches (Figure 3A), and distance L_ℓ is about 3 inches, the spacing between each second light source unit 90b and the first light source unit 90a of the adjacent light source module 60 is also about 3 inches. Thus, a plurality of light source units 90a, 90b may be spaced about 3 inches apart. Lighting system 10 may extend over a distance of several feet or several yards, accordingly, lighting system 10 may include several dozen or more light source units 90a, 90b.

Figure 4A is an isometric view of a wiring assembly 20 for a lighting system 10, and Figure 4B is an exploded isometric view of the wiring assembly

20 of Figure 4B, according to another embodiment of the invention. Wiring assembly 20 may include a connector unit 40 electrically coupled to first, second, third, and fourth wires 32a-d, generally as described hereinabove with respect to Figure 3A. Connector unit 40 may comprise a connector lid 22 and a connector base 24 attachable to connector lid 22.

With reference to Figure 4B, connector lid 22 may include a first, second, third, and fourth connector port 26a, 26b, 26c, and 26d, respectively. First, second, third, and fourth connector ports 26a-d may be adapted for receiving first, second, third, and fourth connection posts 28a, 28b, 28c, and 28d, respectively. First, second, third, and fourth connection posts 28a-d may be electrically coupled to first, second, third, and fourth wires 32a-d, respectively. Light source module may be readily electrically coupled to first, second, third, and fourth wires 32a-d via first, second, third, and fourth connection posts 28a-d, respectively. First, second, third, and fourth wires 32a-d may each comprise insulated copper wire, e.g., braided wire.

In some embodiments, first, second, third, and fourth connection posts 28a-d may be coupled to first, second, third, and fourth wires 32a-d, respectively, via a metal spike or tongue (not shown) which penetrates and makes electrical contact with the braided copper. For example, each of first, second, third, and fourth connection posts 28a-d may extend into a sharp spike adapted for insertion into first, second, third, and fourth wires 32a-d to provide electrical coupling of first, second, third, and fourth connection posts 28a-d to first, second, third, and fourth wires 32a-d, respectively. A connection post extension (not shown) of each of first, second, third, and fourth connection posts 28a-d may extend, e.g., in a direction at least substantially parallel to first, second, third, and fourth wires 32a-d. First, second, third, and fourth connection posts 28a-d may be mechanically affixed to first, second, third, and fourth wires 32a-d via a first, second, third, and fourth sleeve 27a-d retained around each connection post extension.

Connector base 24 may include first, second, third, and fourth grooves 29a-d for accommodating first, second, third, and fourth wires 32a-d, respectively. Connector lid 22 may have an analogous set of grooves (not shown).

Figure 5 is an exploded isometric view of a light source module 60 for a lighting system 10, according to another embodiment of the invention. Light source module 60 may comprise a light source cover 62 and a light source base 64. Light source cover 62 and light source base 64 may be adapted to attach to each other to provide a housing 70 (see, for example, Figure 2) for accommodating circuit board 80. Typically, at least a portion of light source cover 62 may be transparent or translucent to visible light. In some embodiments, light source cover 62 may be transparent to visible light in its entirety. Light source cover 62 may comprise a colorless, transparent plastic, such as a polycarbonate, and the like. Light source base 64 may include first, second, third, and fourth bores (not shown) for receiving first, second, third, and fourth connection posts 28a-d (see, Figures 4A-B).

Circuit board 80 may comprise a first light source unit 90a and a second light source unit 90b. Each light source unit 90a, 90b may comprise a first, second, and third LED 92a, 92b, 92c, respectively. First, second, and third LEDs 92a-c may be disposed on circuit board 80 in a triangular configuration. First, second, and third LEDs 92a-c may respectively comprise a blue LED, a green LED, and a red LED. Power to all three of first, second, and third LEDs 92-c may be provided simultaneously to provide white light from the combined emissions of a blue LED, a green LED, and a red LED. The relative intensities of light emitted from first, second, and third LEDs 92a-c may be independently controlled to provide light of an infinite variety of colors. Light source module 60 may be adapted for facile connection to, and disconnection from, connector unit 40 (see, for example, Figure 4A)

Figure 6A is an isometric view of a lighting system 10 including a partially assembled mounting assembly 50, wherein mounting assembly 50 is

shown in relation to a wiring harness 30 and a light source module 60 of lighting system 10, according to another embodiment of the invention. Figure 6B is an exploded isometric view of the lighting system 10 of Figure 6A. Mounting assembly 50 may comprise a wire cover 52 and a mounting base 54. Wire cover 52 and mounting base 54 may be adapted such that wire cover 52 can readily be attached to mounting base 54; for example, wire cover 52 may be adapted to snap into affixed relationship with respect to mounting base 54. Wire cover 52 may be adapted to enclose or contain first, second, third, and fourth wires 32a-d of wiring harness 30. Wire cover 52 and mounting base 54 may each comprise a durable plastic, such as PVC, and the like. Such plastics are well known in the art.

Light source module 60 may be readily connected to, or disconnected from, connector unit 40, to provide electrical coupling of circuit board 80 to first, second, third, and fourth wires 32a-d. Such connection and disconnection of light source module 60 may be performed after wiring harness 30 has been encased or enclosed within wire cover 52 and mounting base 54.

Mounting assembly 50 may be adapted for convenient attachment to a separate structure 14 (see, for example, Figure 7). Various suitable attachment means, including hooks, screws, adhesives, hook and loop fasteners (e.g., Velcro™), adhesive tape, and the like, may be used to mount lighting system 10 to separate structure 14. Although a screw 55 is shown in Figure 6B, it is to be understood that the invention is not limited to attachment of mounting assembly 50 via screws.

Figure 7 schematically represents a lighting system 10 mounted to a structure 14, according to another embodiment of the invention. Lighting system 10 may be mounted to structure 14, for example, via mounting assembly 50 (Figures 6A-B). Structure 14 may comprise, as an example, a wall, a ceiling, a floor, and the like. However, it is to be understood that the invention is not limited to attachment of lighting system 10 to a separate structure. Accordingly,

in alternative embodiments, lighting system 10 may remain free and unattached to any separate structure.

Figure 8 schematically represents a series of steps involved in a method 100 for lighting a space with a lighting system, according to another embodiment of the invention, wherein step 102 may involve providing a lighting system of the present invention. The lighting system provided in step 102 may have various elements, features, and characteristics as described hereinabove for lighting system 10 with respect to Figures 1-7.

Step 104 may involve positioning the lighting system provided in prior step 102. Step 104 may involve positioning the lighting system adjacent to, or in at least close proximity to, a spatial area or space to be illuminated by the lighting system. In some embodiments, step 104 may involve mounting the lighting system to a separate structure, wherein the structure may comprise a wall, a ceiling, or the like, and wherein the structure may be within a building. In alternative embodiments, step 104 may involve positioning the lighting system without attachment of the lighting system to a separate structure.

Step 106 may involve controlling light emission from one or more light source modules of the lighting system. Typically, step 106 may involve emitting light simultaneously from a plurality of light source modules, wherein the light source modules may have various elements, features, and characteristics as described hereinabove for light source module 60, e.g., with respect to Figures 2 and 5. Step 106 may involve independently controlling the relative intensity of light emitted from differently colored LEDs, e.g., a red LED, a green LED, and a blue LED, to provide a combined light emission of a desired color and intensity.

It should be understood, of course, that the foregoing relates to exemplary embodiments of the invention and that modifications may be made without departing from the spirit and scope of the invention as set forth in the following claims.

WE CLAIM:

1. A lighting system, comprising:

a wiring assembly including a wiring harness and a plurality of connector units electrically coupled to said wiring harness; and

at least one light source module adapted for facile connection to, and facile disconnection from, each of said connector units, wherein said light source module includes at least one circuit board having at least one light emitting diode mounted therein.

2. A lighting system for mounting to a structure, comprising:

a wiring assembly including a wiring harness and a plurality of connector units electrically coupled to said wiring harness; and

at least one light source module adapted for facile connection to, and facile disconnection from, each of said connector units; and

a mounting assembly adapted for containing said wiring harness, wherein:

said mounting assembly is further adapted for mounting said wiring assembly and said at least one light source module to said structure,

said light source module includes at least one circuit board including at least one light source unit, and

each said light source unit comprises a plurality of light emitting diodes.

3. A light source module for a lighting system, comprising:

a housing, wherein at least a portion of said housing is transparent or translucent to visible light;

at least one circuit board disposed within said housing; and

a pair of light source units mounted at opposing ends of said circuit board, wherein each light source unit includes a red light emitting diode, a blue light emitting diode, and a green light emitting diode.

4. A wiring assembly, comprising:

a wiring harness; and

a plurality of connector units electrically coupled to said wiring harness, wherein:

said connector units are spaced apart on said wiring harness,

said wiring harness comprising a plurality of wires,

each of said connector units comprises a plurality of connection posts, and

each of said connection posts is coupled to a corresponding one of said wires.

5. A method for lighting a space, comprising:

a) providing a lighting system, said lighting system including a wiring assembly and a plurality of light source modules electrically coupled to said wiring assembly, wherein each said light source module includes at least one circuit board, said circuit board including at least one light source unit, and said light source unit including a plurality of light emitting diodes;

b) positioning said lighting system with respect to said space; and

c) emitting light from said at least one light source unit.

6. A method for lighting a space, comprising:

a) providing a lighting system, said lighting system including at least one wiring assembly and a plurality of light source modules, each said light source module adapted for facile connection to, and facile disconnection from, said wiring assembly, wherein said light source module includes at least one circuit board, each said circuit board including a plurality of light source units, and each said light source unit comprising:

a red light emitting diode,

a green light emitting diode, and

a blue light emitting diode;

b) positioning said lighting system in at least close proximity to said space; and

c) independently controlling emission of light from each of said red light emitting diode, said green light emitting diode, and said blue light emitting diode.

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FIG. 1

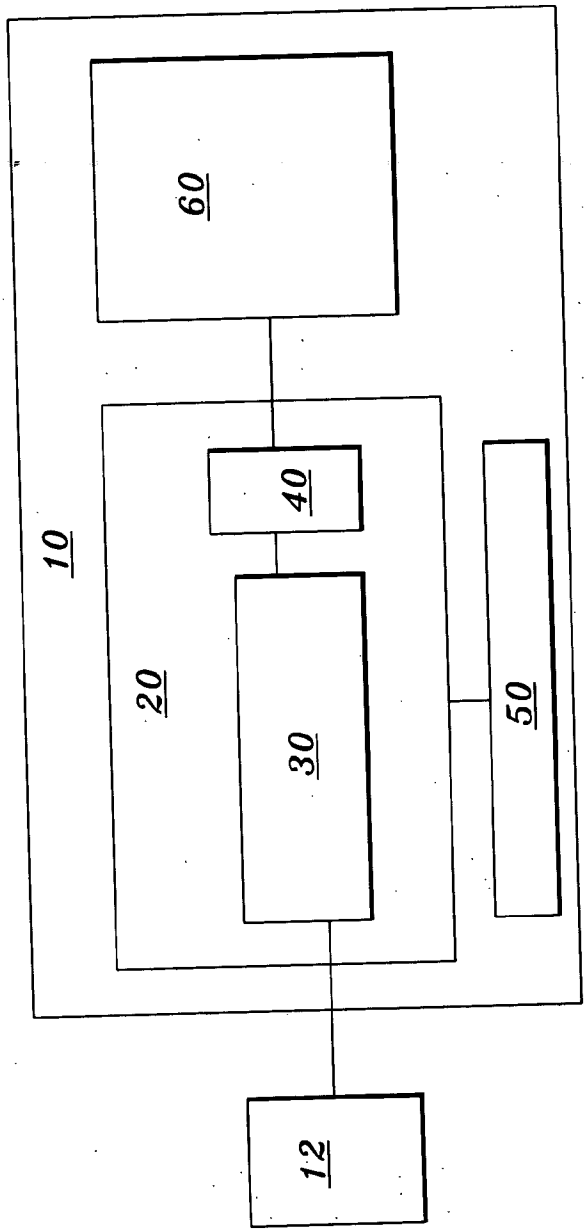
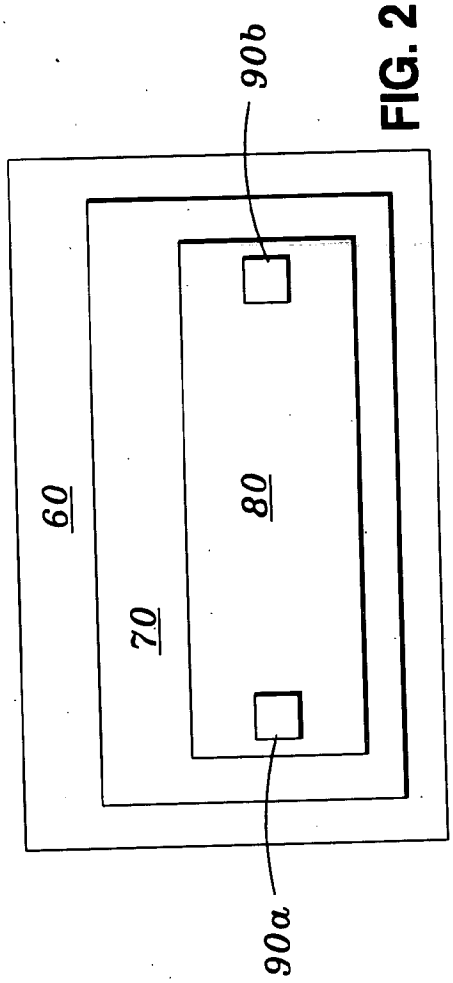


FIG. 2



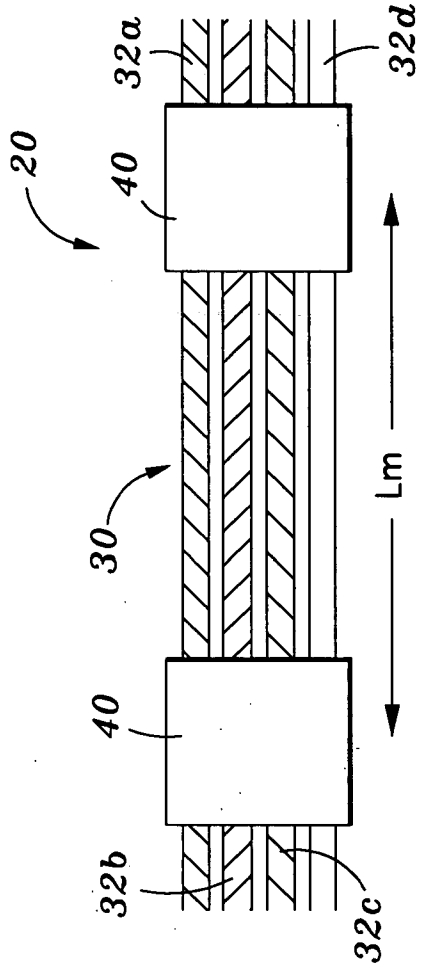


FIG. 3A

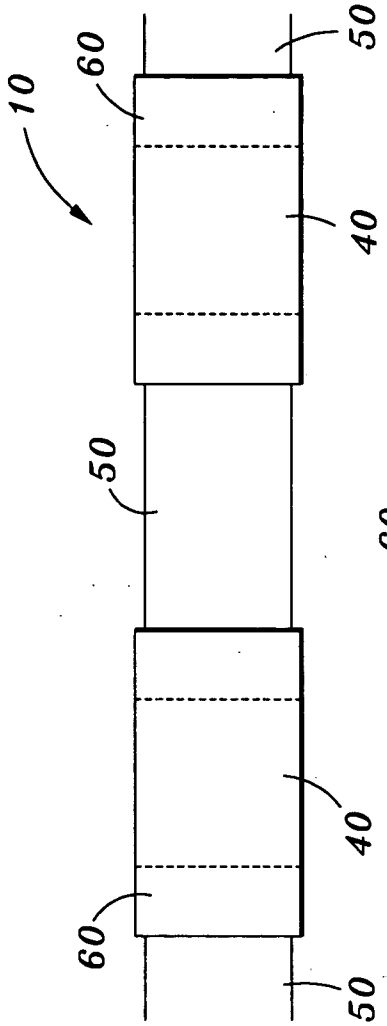


FIG. 3B

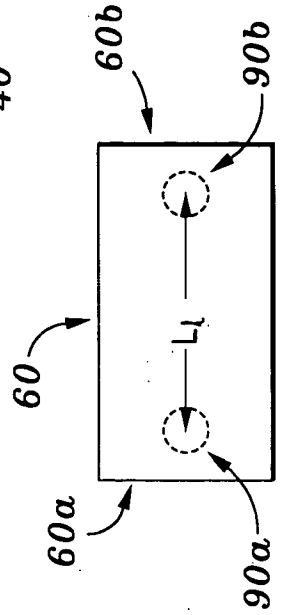


FIG. 3C

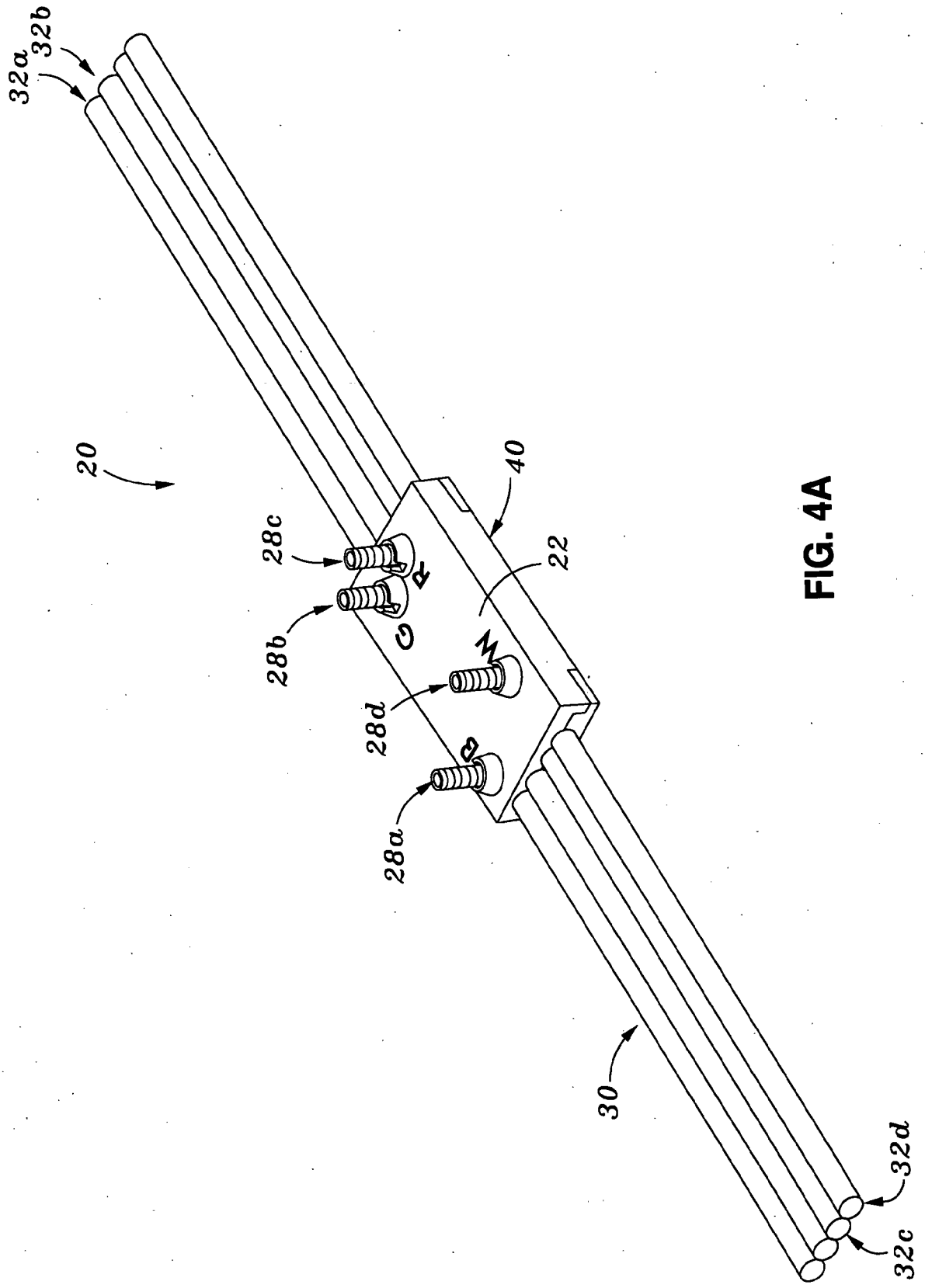


FIG. 4A

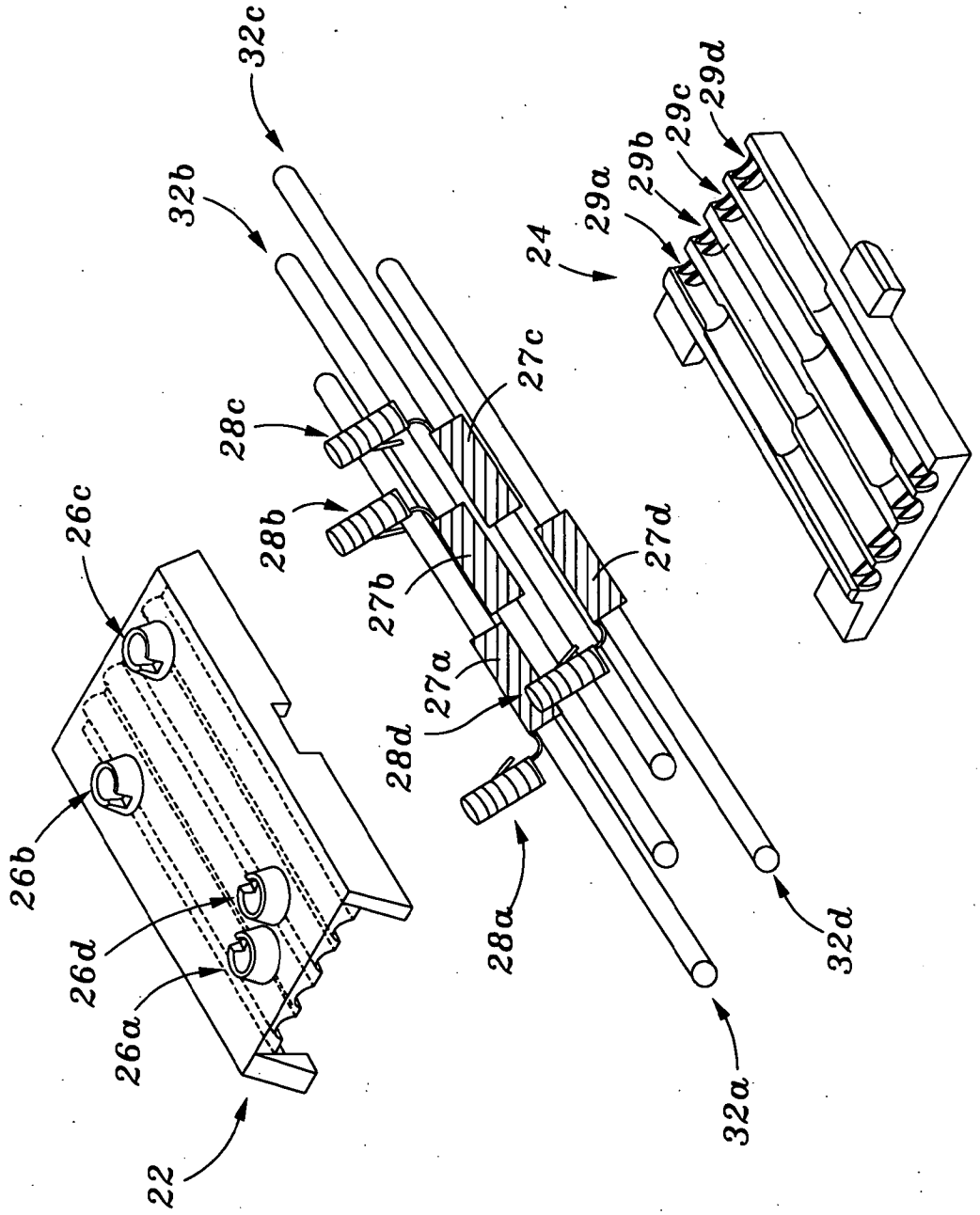

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FIG. 4B

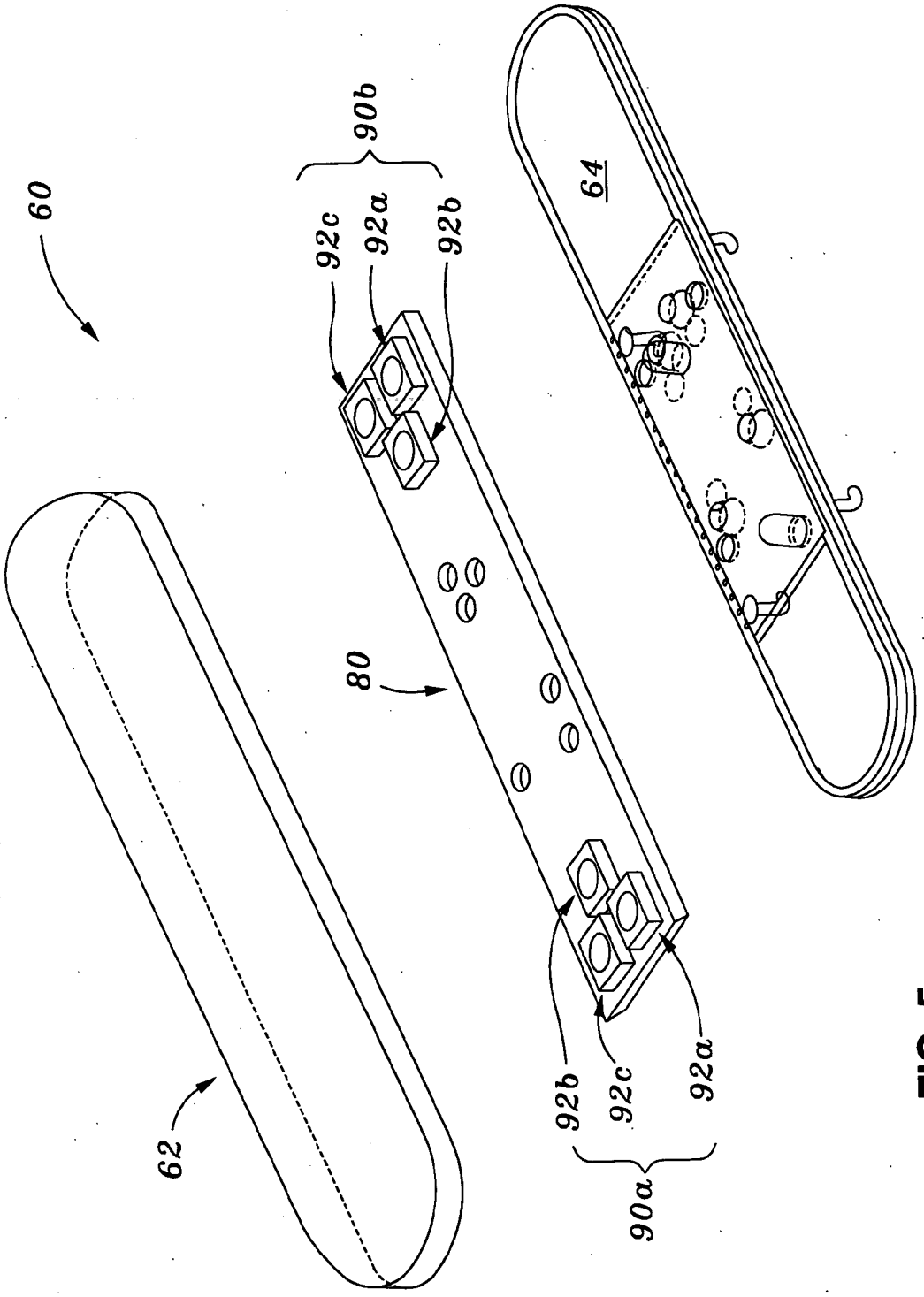

FIG. 5

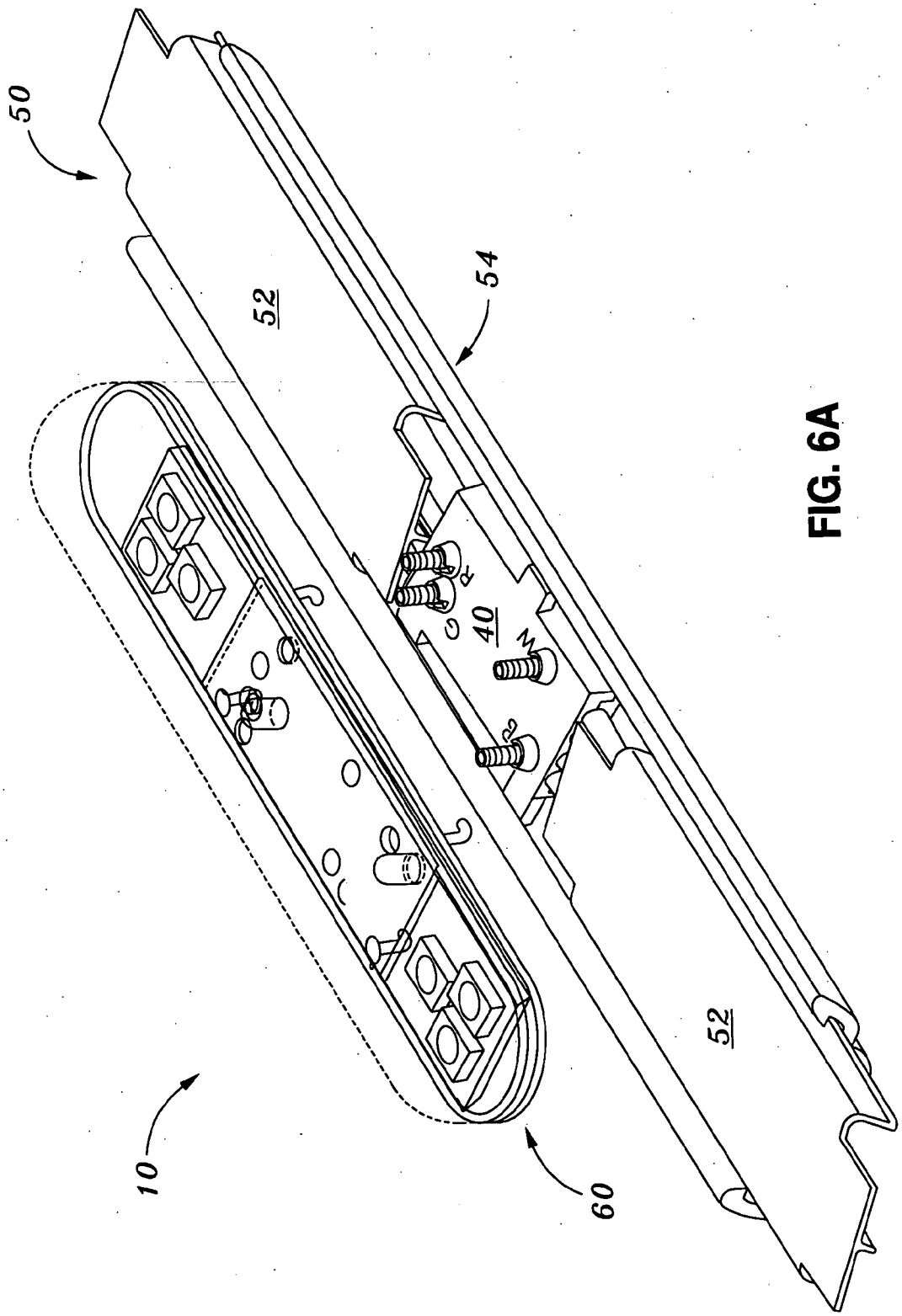

FIG. 6A

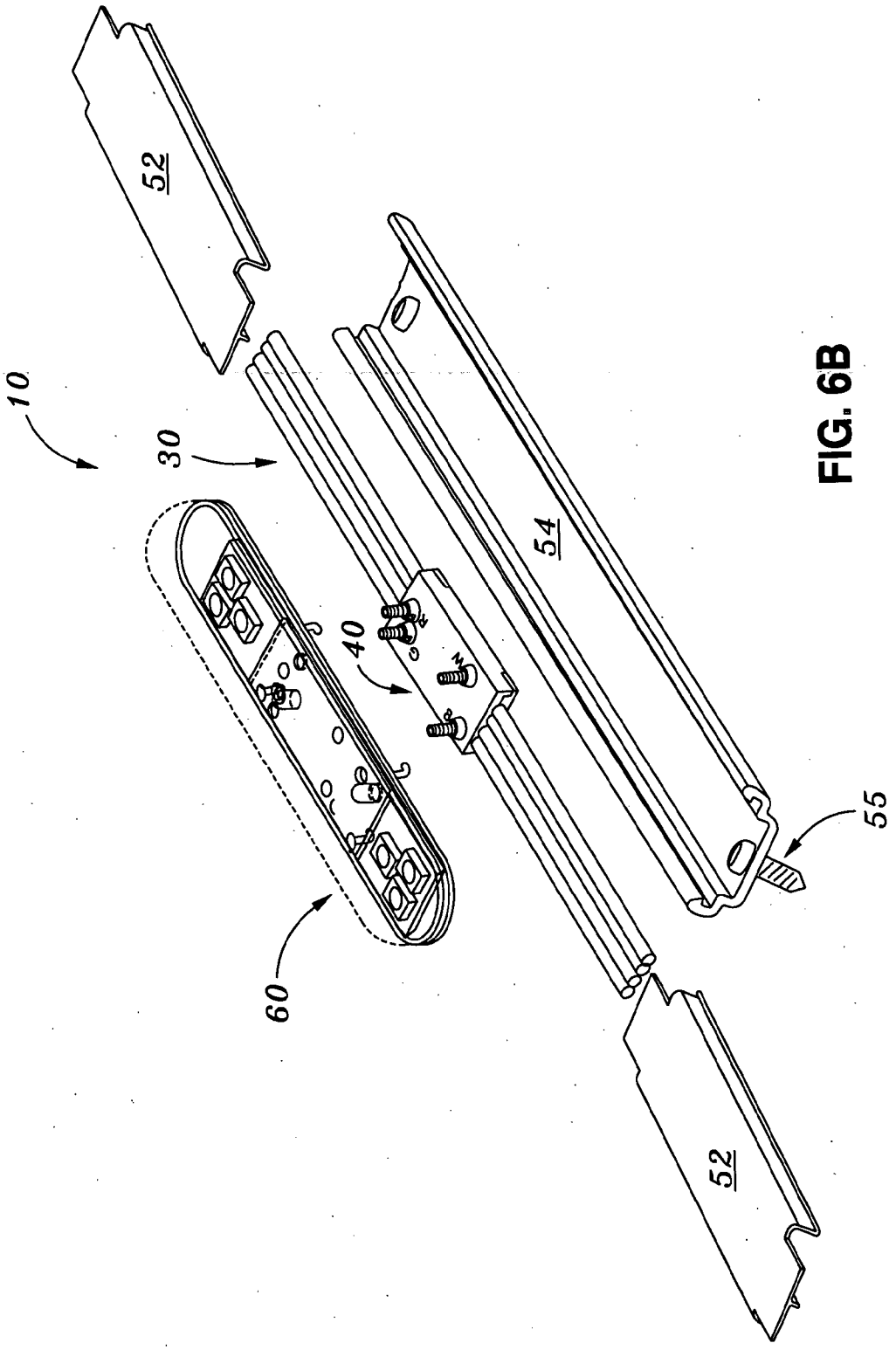

FIG. 6B

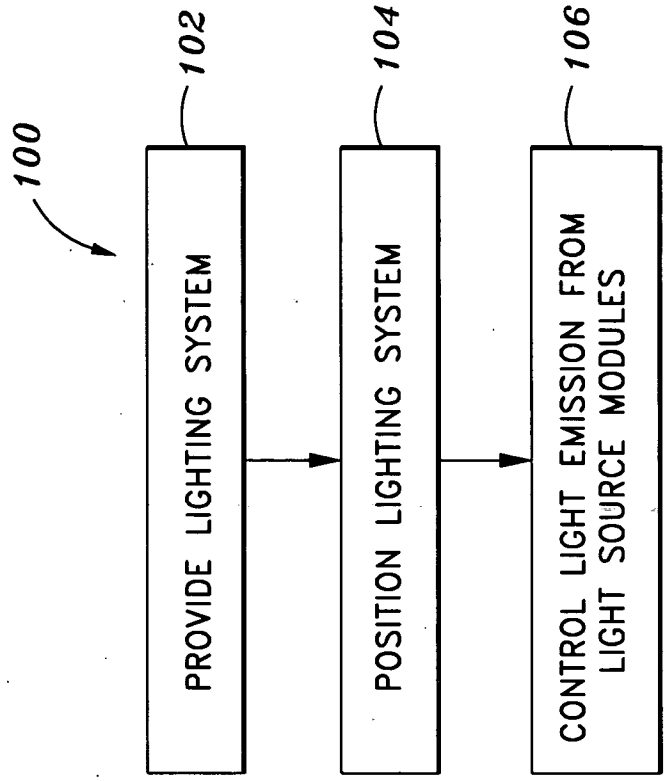
100
102
104
106
PROVIDE LIGHTING SYSTEM
POSITION LIGHTING SYSTEM
CONTROL LIGHT EMISSION FROM LIGHT SOURCE MODULES

FIG. 8

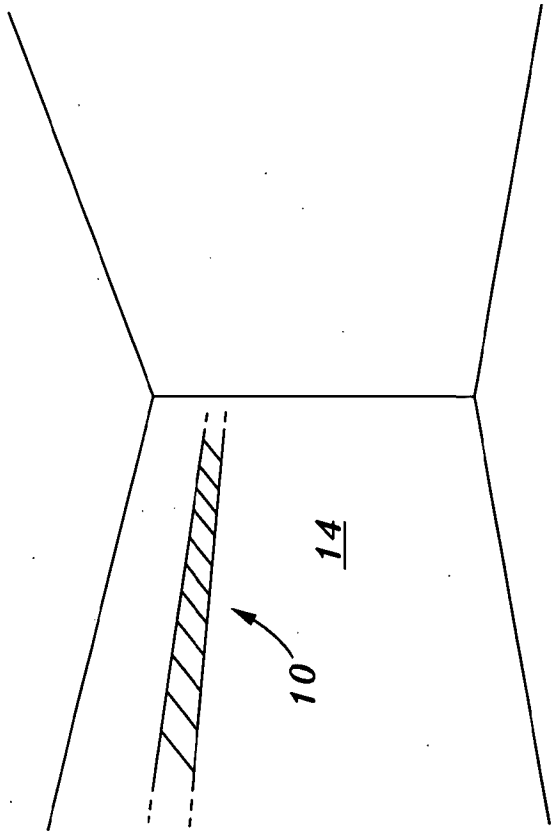
14
10

FIG. 7